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ECONOMIC DEVELOPMENT ANALYSIS
OF
CITY OF DRUMHELLER
AND AREA
PROVINCE OF ALBERTA

DEPARTMENT OF THE PROVINCIAL SECRETARY
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SECTION A

ANALYSIS [1959]

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Aerial View of Drumheller

SUMMARY

THE CITY OF DRUMHELLER, located some 88 road miles north-east of Calgary, has developed into a commercial centre for a large agricultural are . Additional impetus is given to the city's economy by coal mining operations in the vicinity although these operations have declined in importance and influence in recent years. Coal mining continues to offer employment to the residents in the Drumheller area and may well result in the establishing of additional industry to take advantage of high and low employment peaks in coal mining. (See Potential Industries, Section B.)

The City of Drumheller and its surrounding area is served by excellent Schools, Hospital and Medical Facilities, as well as Financial Institutions, Government Offices, Railways and other means of transportation.

Tourist potential in the area, centering on the "Badlands", the "Dinosaur Trail" and the peculiar earth formations, if properly developed, could become an important contributor to the City of Drumheller's economy.

Increased industrial activity in the Drumheller area is well within the bounds of possibility but will require a continuous and co-ordinated effort on the part of the Provincial and Muncipal officials charged with this responsibility.

CONCLUSIONS

1. The Drumheller area has all the necessary requirements for industrial development.
   - (a) Cheap coal for heating and steam purposes
   - (b) Locally produced natural gas
   - (c) Competitively priced electricity
   - (d) Sufficient water for industrial purposes
   - (e) Adequate waste disposal facilities
   - (f) Good road and rail transportation connections
   - (g) Available industrial sites
2. Enough employees would be available, or could be attracted to the area, to staff future industries.
3. Paving of Highway 59 between Morin and Stettler will improve highway connections to the city and the rest of Alberta.
4. More employment is provided by retail and service facilities in Drumheller than by coal mining.
5. The location of the City of Drumheller, away from the areas of large oil and gas discoveries, has tended to obscure its potential and natural advantages.
6. In transit privileges are available for industries settling in the area subject to negotiations with the Railways involved.
7. The unique beauty of the Badlands and large fossil deposits in the area provide the basis for increased tourist activity if properly promoted and developed.
8. A Zoning By-law is needed now to safeguard individual and corporate investment.

IT IS RECOMMENDED THAT:

1. The advantages of locating in Drumheller be pointed out to those types of industry named under Section B.
2. The City of Drumheller in co-operation with the Department of Industry and Development, actively promote the area.
3. Measures be taken to further the Tourist trade in the Badlands.
4. A Zoning By-law be designed and adopted by the City of Drumheller.
5. Joint action be taken by the merchants of Drumheller to:
   - (a) Improve the outward appearance of the business district.
   - (b) Increase the number and quality of consumer goods carried.
   - (c) Start a "Buy in Drumheller" campaign throughout the city's area of influence.

SOME BASIC FACTS

The City of Drumheller is located in Census Division 5 which contained 38,120 people in 1956[1]. This is a decline of 935 people from the total of 39,055 in 1951[1]. The decrease in population coincides with the decline in employment in the coal industry from 1,712 in 1951 to 905 in 1956. This is a decrease of 807 employees. Assuming that the family size of the laid-off miners was 3.2 and also assuming that they left the area, the population loss would have been approximately 2,582. The difference between the theoretical population loss and the actual population loss (1,677) is the result of the natural population increase in the area of approximately 4.3% during the same period. This population increase is considerably below the average increase for Alberta during the same period. This is not unusual for a rural area with only small cities and little or no industry. In effect then, the net population loss of 2.4% in Census Division 5 would have been greater if the loss in mining employment had not been offset by increased employment in other fields.

According to the "1959 Taxation Statistic" published by the Department of National Revenue and showing individual income tax figures for 1957[2], the people of Alberta earned $1,192,796,000. Of this amount, wages and salaries accounted for $940,786,000 or 78.87% of the total. Earned and Investment income[3] accounted for the balance.

Census Division 5 Total Income[4] for the same period was $26,197,000 of which $12,738,000 was accounted for by Wages and Salaries or 48.62% of the total. The remaining 51.38% was made up of earned and investment income[3].

Income then in 1957 from Wages and Salaries in Census Division 5 is below that of the Province of Alberta as a whole. This is attributed to the lack of large cities and major industrial activity in the area.

1. Source: D. B. S. Census of Population Canada 1956. Counties and Subdivisions. Bulletin 1-5, Page 6-51.
   (Note: While different Census Boundary Divisions existed in 1951 and 1956 adjustments were made by D.B.S. to provide valid comparisons between the two periods. See Bulletin 1-5 above.)
2. Based on page 66, Table 5, Taxation Statistics 1959. Department of National Revenue, Taxation Division.
3. Earned Income contains the following classifications: Business, Professional, Commission, Farm or Fishing, Old Age Pension, other earned income. Investment Income contains: Dividends, Bond and Bank Interest, Rental Income, Mortgage Interest, Annuity and Estate Income and other Investment Income.
4. The Department of National Revenue total income for Census Division 5 in 1957 is for the area encompassed in the Province of Alberta 1956 Census Division 5 boundary. (See Notes on the Separate Tables, page 28, Table 5, Taxation Statistics, Department of National Revenue, 1959.)

Grows Slowly

Drumheller, located some 88 road miles north-east of Calgary, is the only city in Census Division 5 of the Province of Alberta. The population of the City of Drumheller was estimated at 2,725 people on December 31, 1959, while an additional 4,450 people reside within a six mile radius of the city.

In spite of mine closures, the city has continued to grow slowly. (1951—2,601; 1956—2,632; 1959—2,725.)

In 1959, total income of the residents of the City of Drumheller was arbitrarily estimated at $2,738,625 which represents a per capita income of $1,005.00. Income for the 4,450 people in the surrounding area was estimated at $3,793,725, a per capita income of $852.50.

Total income for Drumheller's prime area of influence is therefore estimated at $6,532,350.

Economic History

The City of Drumheller was established originally on the basis of working the coal deposits in the immediate surrounding area. In the heyday of coal, the city was a typical coal mining community

with few other business interests not connected directly or indirectly with coal mining. With the decline of coal mining and increased agricultural activity in the surrounding area the economy of the city changed. Today Drumheller is a retail and service city for a large agricultural area with 70.2% of the city's labour force employed in the retail and service field and only 29.8% employed in coal mining and manufacturing. The changeover from mining town to service town has been successful; however the physical appearance of the city has in general remained unchanged.

Location

Drumheller is located in the south-eastern section of Central Alberta approximately sixty air miles east of the Edmonton-Calgary Highway. Highway mileage from Drumheller to various western Canadian cities is as follows:

	Miles
To Calgary, Alberta	88
To Edmonton, Alberta	182
To Red Deer, Alberta	123*
To Medicine Hat, Alberta	231†
To Lethbridge, Alberta	181
To Saskatoon, Saskatchewan	338
To Regina, Saskatchewan	474
To Vancouver, British Columbia	887

* Via Stettler

† Via Highways No. 9 and No. 1.

The above table demonstrates that Drumheller is within reasonable road distance from the large production and population centres in the Province of Alberta and western Saskatchewan.

Vancouver, British Columbia, is the nearest deep-sea port.

Climate

Drumheller's location in the valley of the Red Deer River tends to give it a higher average temperature than the surrounding area. Summers are pleasant, warm during the day but cool at night. Winters are invigorating, dry and with many days of bright sunshine. Drumheller is within Southern Alberta's Chinook area. The Chinook is most effective when it occurs after a cold period with snow. The sky clears abruptly and temperatures may rise as much as 60° F. in a relatively short time. The bright sunshine and above freezing temperatures cause the snow to melt rapidly. Temperatures as high as 61° F. in Calgary, 65° F. in Lethbridge and 66° F. in Medicine Hat in January are common and indicate the warming effect of the climate in Southern Alberta.*

Prevailing winds in Drumheller are from the West.

* Canada Year Book 1959, The Climate of Canada.

Appearance

The location of Drumheller on flat land in the wide sweeping curve of the gently flowing Red Deer River tends to produce a picturesque setting. The interesting earth formation encountered on the outskirts of the city add a unique and natural beauty to the area. There are a number of new stores, commercial buildings and houses. New subdivision land has been made available by the city.

Streets are well maintained and the greater number are paved.

TRADE, INDUSTRY AND EMPLOYMENT

Drumheller's Mining Industry

At present there are seven operating mines in the Drumheller area, none of which is located in Drumheller City proper. Production and employment in the coal mines have shown a steady decline in recent years.

It is expected that mines in the area can retain their present level of production and employment, although cost factors might force the mine owners to increase productivity by further mechanization. Average annual earnings of mine employees have declined from $3,003.00 in 1951 to $2,985.00 in 1959, although production increased per employee, from 802 tons in 1951 to 847 tons in 1958. This slight decline in production cost per ton is not sufficient to raise hopes of large quantity consumers returning to the use of coal and creating a comeback of the industry.

Although comparable quantities of coal, measured in B.T.U.'s can be brought to the surface more cheaply than crude oil, the subsequent transportation cost differences negate this original advantage. Experiments are being conducted with new methods of transporting coal (pipelines and conveyors); however it is felt it will be some years before these methods may become practicable. These experiments if successful, may not necessarily be applicable to Drumheller mines.

The sustained production principle (coal is produced on a continuing basis during the whole year and stored during the off-season) has recently been introduced by some operators in the Drumheller area. This method secures year-round employment for a smaller number of employees rather than seasonal employment for a larger number. Should this method be successful it will help stabilize mining employment in the area.

A stabilization of employment and production at the present level then is anticipated for the Drumheller coal mining industry. A major production increase however seems unlikely in the near future.

Other Industry

There is little other industry in the usual sense of the word in Drumheller. Most of Drumheller industries, with the exception of the furniture factory and sash and door factories, although classified as "manufacturing industries", are service establishments. A complete list of the manufacturing establishments is given below:

Furniture Manufacture	1
Machine Shop	2
Printing and Publishing	2
Woodwork, Sash and Door	2
Slaughterhouse	1
Total	8
Total number of employees in December, 1959	22

To realize its full industrial potential a community must have established firms in growth industries or must attract firms in these fields.

Labour Force

The composition of the Drumheller area labour force in November 1959 was broadly classified as follows:

	Employed	Available for Employment	Total
Retail	275	34	309
Services	28	5	33
Hotels and Restaurants	98	25	123
Manufacturing and Mining (all)	629	79	708
Wholesale	29	1	30
Construction (Building and Road)	92	100	192
Miscellaneous Service	24	2	26
*Trades and Finance	57	19	76
Utilities	92	—	92
Federal - Provincial	210	—	210
Medical	106	—	106
Schools	47	—	47
Transportation	79	58	137
Miscellaneous	—	19	19
	1,766	342	2,108

For further unemployment statistics and wage rates see Appendix, Table IA IB, II and III.

* Includes office personnel
Table is based on National Employment Service figures.

Retail Trade

The establishment of Drumheller as a retail and service centre for the outlying areas has helped maintain economic stability during the decline of coal mining.

The recent opening of radio station CJDV in Drumheller is drawing attention to the retail facilities available in the city and has increased the city's area of influence. Retail sales have definitely increased since the opening of the station according to reports from businessmen.

The importance of retail and services in the economy of Drumheller can be readily assessed by the number of people gainfully employed in these activities. A breakdown of retail and service employment is given below:

Retail Stores	275
Services	52
Trade and Finance	57
Restaurants, Hotels, etc.	98
Transportation	79
	561

The city's prime area of retail influence is the Red Deer River Valley including East Coulee and contains an estimated 7,176 people.

The secondary area of retail influence extends approximately thirty miles in all directions. The total of the primary and secondary areas of influence contain approximately 23,000 people.

In 1959 retail sales in Drumheller were estimated at $7,350,000, 43.8% of these dollar purchases were estimated to have been made by residents of Drumheller and those residents within

a six mile radius, while an estimated 56.2% of the purchases were made by residents in the secondary area of influence.

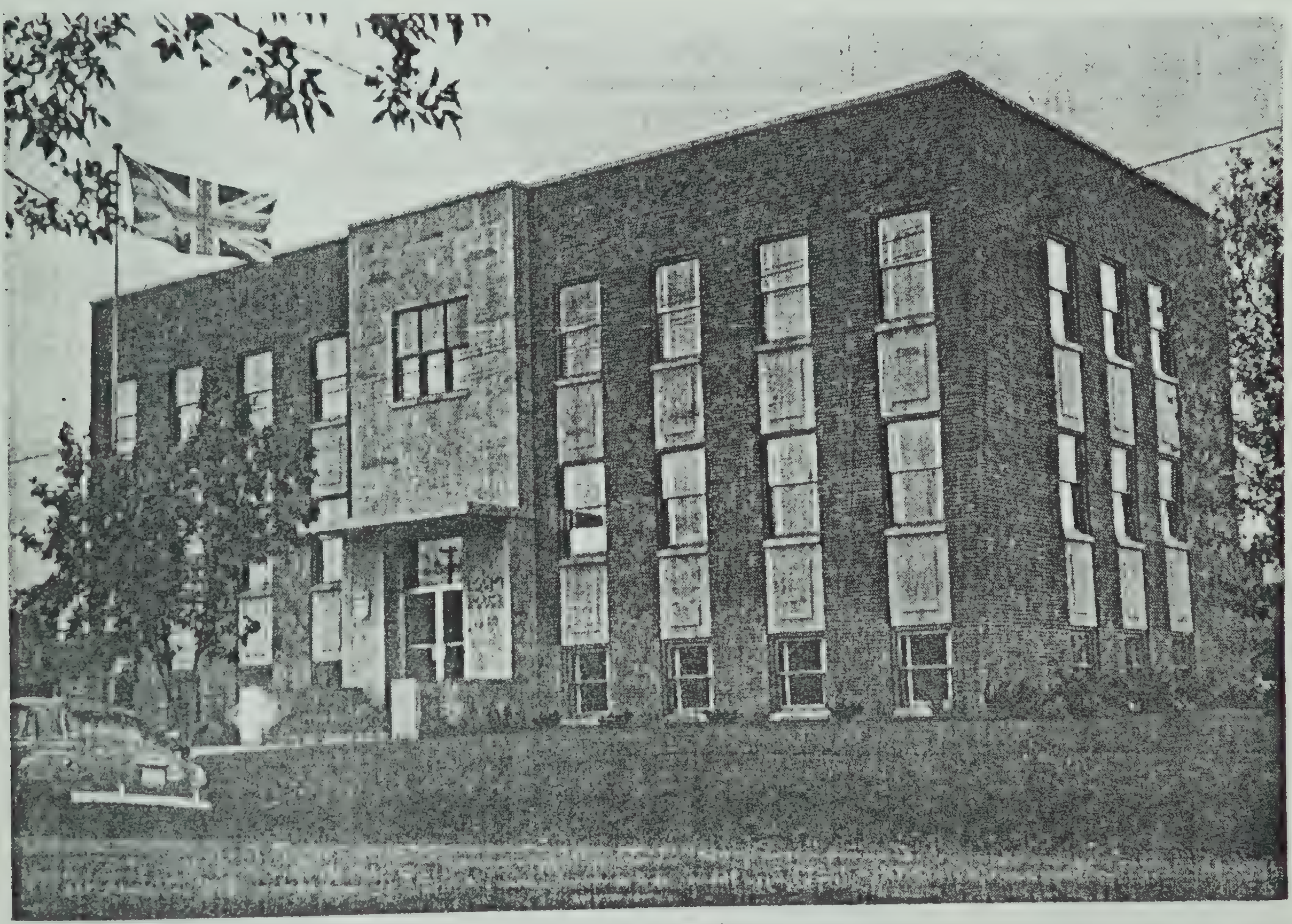
The proximity of Calgary has in the past tended to hamper maximum potential development of the Drumheller business district. The inhabitants of the city were to some extent responsible for this as their shopping habits for durable goods favored the Calgary market.

With the radio station drawing attention from a larger area to Drumheller's commercial district the time has come for the merchants of Drumheller to give serious consideration to expanding and upgrading their facilities to handle the increased potential from the outside area and to regain business from local residents presently going to Calgary.

Wholesale Trade

Transportation facilities and the proximity of Calgary limit to some extent the importance of Drumheller's wholesale trade.

Wholesale sales for 1959 are estimated at $1,950,000.00.



Drumheller Courthouse

Government and Other Services

The provincial and municipal governments, schools and the hospital provide steady employment for 260 people. This group represents 13% of the labour force and adds considerably to the stability of the Drumheller economy. The presence of the Court House, Treasury Branch, Hospital, District Agriculturist and other public offices tends to attract residents from the outside area to the city and helps increase its importance as a service centre.

RESOURCES

Coal

Coal deposits in the Drumheller area are plentiful and are of a sub-bituminous nature. The coal is not suitable for coking but is good for heating purposes. With certain additives it is possible to make a briquetting material. (See Report on the Beneficiation of Drumheller Sub-bituminuos Coal by Briquetting, E. Swartzman. Memorandum Series No. 92, July 1947.)

A more recent study, A Laboratory Study of the Binderless Briquetting of Western Canadian Coals by A. R. McKenzie, J. L. Picard and J. Visman*, shows that briquetting of Drumheller coal without additives is technically possible. The economic aspects of this process are not discussed in the report and therefore no conclusions can be reached on the economic practicablity of this process.

* Department of Mines and Technical Surveys, Ottawa, TB 10.

Gas and Oil

There are several small gas and oil fields in the surrounding area of Drumheller. Although these fields could support a small scrubbing and separation plant, the size of the known fields is not sufficient to support a large scale chemical industry and/or refineries.

An analysis of the Gas is given in Tables IV and V in the Appendix.

Shale

There is some shale found in the Drumheller area. The shale is of the expanding variety but known quantities are not sufficient to support a local expanding shale manufacturing industry.

Bentonite

As there are many controversial opinions with regard to the quality and economics of the Bentonite deposits in the Drumheller area the following is quoted verbatim from:

Bentonite in Alberta by P. J. S. Byrne

Research Council of Alberta, Report No. 71

"1. **Drumheller:**

Several beds of pure bentonite occur in the Drumheller area. The apparent prevalence of bentonite in this particular region is due to the fact that bentonite is very common in the lower and middle members of the Edmonton formation as defined by Allan and Sanderson (1945). The Drumheller area has the best outcrops in the province of this particular stratigraphic horizon."

"The best known bentonite deposit in the Drumheller area is a three-foot bed occuring on a ridge 1½ miles north of Drumheller in the NW ¼ section 14, township 29, range 20, west of the 4th meridian. This has been mined intermittently for a number of years. Test results on the bentonite show it to have a yield of 56 barrels per ton and a silt content of 2.3%. It is claimed that the deposit is fairly constant in quality (Kidd, 1954)."

"The bentonite horizon described above can be traced both upstream and downstream from this deposit. Downstream, the deposit passes under heavy overburden and gradually grades into white bentonitic sandstone within about half a mile. Upstream, the bed can be traced for about two miles. Detailed examination at two localities showed that the bed was too silty for commercial use. The same horizon was picked up on the other side of the river in the NE ¼ section 34, township 28, range 20, west of the 4th meridian, where about one foot of pure-looking bentonite is present. This bed appears to become siltier both upstream and downstream." "The above discussion illustrates the considerable variability of bentonite beds within the Edmonton formation. Other bentonite deposits in the Drumheller area are discussed in the following sections."

"2. **Rosedale**

A thin parting of bentonite occurs throughout the Drumheller region in the No. 1 coal seam of the Edmonton formation (Allan and Sanderson, 1945). The parting is well developed at the Aetna coal mine at Rosedale, where it attains a thickness of six to eight inches. A representative sample of the bentonite gave a yield of 90 barrels per ton. The silt content is negligible, while the thixotrophy is quite low."

"This bentonite might be obtained while mining coal, but the thinness of the bed would make control of quality very difficult. Furthermore, the variability in the thickness of the bed would lead to uncertainty concerning the amount mined in any given period."

"3. **Newcastle**

A variable bed of bentonite is present in the Edmonton formation under light overburden over a fairly large area of the SE ¼ section 9, township 29, range 20, west of the 4th meridian. The bentonite, which varies from five to ten feet in thickness, is fairly silty and contains local lenses of fine-grained sandstone. Three samples taken from the bed gave yields varying from 42 to 66 barrels per ton; the silt contents varied from 3.9 to 11.6%. Since lenses of sandstone were avoided when sampling, the bed would appear to be too silty to warrant exploitation."

"**Summary and Conclusions**

Bentonite is a common constituent of Upper Cretaceous sediments in Alberta, the most promising deposits found to date occurring in the Bearpaw and Edmonton formations. All deposits tested to date, except for a thin bed occurring as a parting in a coal seam, were found deficient in drilling fluid characteristics. In the course of the survey, the Bearpaw formation was examined in more detail than the Edmonton formation due to a shortage of outcrops of the latter."

"In general, the bentonites occurring in the Edmonton formation appear to be of higher quality than those in the Bearpaw formation. It would seem that future prospecting should be concentrated in the Edmonton formation."

NOTE: Since publication of report No. 71 drilling mud is being produced from other Alberta bentonite deposits in Rosalind and Onoway. For analysis of bentonite found in the Drumheller area see Appendix, Table VI.

Clay, Sand and Gravel

There are outcroppings of Sand and Gravel in the area. A crushing plant supplies the local building and road needs. Although the quantities available are more than sufficient to supply many other areas in Alberta with sand and gravel, the number and distribution of other deposits in the province negate any advantage Drumheller producers might have.

Agriculture

The immediate surrounding area of Drumheller Municipal Districts 40, 47, 48 and ID 42, is a good agricultural district. Its main products are wheat, barley, oats and flax seed. Some poultry and stock is kept. Diversification by the replacement f grain acreages with other crops such as vegetables would require extensive irrigation. Although plans for irrigation by the damming of one or more of the valleys in the area have been in existence for several decennia no action has yet been taken nor seems likely to be taken in the near future.

In the Red Deer River Valley itself advantage could be taken of the availability of cheap heat to start a greenhouse industry, producing seedlings for the private and industrial gardener in Alberta. The forced growing of flowers in hot houses during the winter period could also be considered.

Agricultural production in the Drumheller area is shown in Table VII in the Appendix.

SERVICES

Financial Facilities

Drumheller is served by the Bank of Montreal and the Canadian Bank of Commerce on a national basis while the Alberta Treasury Branch provides additional banking facilities on a provincial level.

Drumheller School

Schools

Schools in Drumheller, with a staff of 41 teachers on the senior high, junior high and elementary level, are under the jurisdiction of School District 2472. Rating of the schools is excellent.

A separate school (Roman Catholic) is presently under construction.

Medical and Hospital Facilities

Medical services in Drumheller are provided by a "Medical Clinic". The Clinic operates its own insurance scheme under which individuals and companies can obtain full medical coverage for nominal yearly contributions. Members of the Clinic provide the medical staff for the Drumheller Municipal Hospital. The quality of medical services offered is excellent. A number of specialists in different medical fields are members of the Clinic.

The Drumheller Municipal Hospital originally built in 1919 was remodelled in 1929 and again in 1952 and presently has 64 beds and 20 bassinettes. A number of beds are occupied with chronic cases thereby limiting the space for acute cases. The completion of the Provincial Chronic Hospital later this year (1960) is expected to remedy this situation.

Industrial Lands

There is no Zoning By-law in the City of Drumheller. The City Council has recently acquired approximately 55 acres of land for industrial purposes. Some work is required to ready this land before construction can take place. The industrial acreage lies east of the city. As the prevailing wind is from the west this industrial area is well located. The area has frontage on Highway 9 and the C.N.R. mainline.

Industrial Taxation

All industrial property is assessed and taxed as required by the Provincial Government under the City Act.

Housing

No rental units are available in the City of Drumheller, however the city recently opened up a subdivision in which building lots can be purchased for $300.00 each. Sale of these lots is subject to a building covenant.

Entertainment

There is one movie theatre and one drive-in theatre in Drumheller. A number of lodge and church halls provide facilities for social gatherings.

UTILITIES

Electricity

Power in the Drumheller area is provided by Canadian Utilities Limited, a privately owned company. The electricity is generated by a steam generating plant located in Drumheller at the south side of the Red Deer River. The capacity of the present plant is ample to supply additional industries in the area. The design of the plant is such that an additional generating unit could be added if the demand for large quantities of power should arise.

To secure a sufficient amount of power at all times a "hook-up" has been constructed with other Canadian Utilities' generating plants north of Drumheller as well as with the Calgary Power Ltd. system. Charges for Residential services are reasonable (See Appendix, Table VIII). Industrial charges are in line and competitive with those quoted in Edmonton and Calgary.

Gas

Gas is supplied from local wells in the Drumheller area under a ten-year franchise by the Plains Western Gas and Electricity Company Limited. Rates are comparable to those quoted in other Alberta cities and low in comparison with those charged in other provinces. Supply is adequate and total production could be increased through the inclusion of other, presently unused, wells.

Price schedule and analysis of the gas is shown in Appendix, Table IX.

Water

Water, in Drumheller, is provided through the city-owned water works from the Red Deer River and/or a number of wells approximately 40 feet deep. Supply from either source is plentiful. Water rates are comparable to those of other Alberta cities. Large quantities of water for industrial purposes could be obtained directly from the Red Deer River which has an ample flow on a year-round basis. Analysis of both well water and Red Deer River water are given in Appendix, Tables X and XI.

Sewer System

Drumheller is served by a sanitary sewer system, to which industrial plants could be hooked up. Industries with a waste disposal problem may possibly, by locating on the east end of Drumheller, dispose of this material directly into the Red Deer River, as there is little or no population on its banks between Drumheller and Saskatoon (approximately 500 river miles). However waste disposal in the Red Deer River would be subject to the Province of Alberta water protection regulations.

ACCESSIBILITY AND TRANSPORTATION

Road Connections

Drumheller is connected with Calgary to the south by Highway No. 9, an asphalt-paved highway. Highway No. 9 continues north to Morin, then east to Hanna and the Saskatchewan border. There is as yet no paved road connection north of Morin (13 miles north of Drumheller). Highway No. 56, the direct conncetion between Drumheller and Stettler is a gravel road, north of Morin. It is understood that this highway will be paved during the 1960 season thereby providing paved connections with Drumheller with Edmonton, via Morin, Stettler and Lacombe. This will be a definite asset to Drumheller and could conceivably extend its area of influence.

Rail Connections

Drumheller is served by the Canadian National Railway and the Canadian Pacific Railway. The freight yards and offices of the C.N.R. are directly in the city while those of the C.P.R. are located approximately three miles west of the city. However, as both companies use joint trackage between Drumheller and Trefoil, service by both companies to the city exists.

The presence of both railways in Drumheller gives the city excellent passenger and freight connections with the rest of the prairie provinces. Drumheller is directly connected by rail with the following points:

Calgary	(CNR)	(CPR)
Stettler	(CNR)	
Camrose	(CNR)	
Edmonton	(CNR)	
Saskatoon	(CNR)	
Moose Jaw	(CNR)	(CPR)
Regina	(CNR)	(CPR)
Vancouver	(CNR)	(CPR)

It has a daily "Dayliner" Service to Edmonton, leaving Drumheller in the morning and returning at night.

The pattern of rail transportation gives Drumheller shippers some advantages over Calgary shippers. "Piggy-back Service", for example, leaves Drumheller two hours later than Calgary permitting the loading of trailers till approximately 7:00 p.m. versus a 5:00 p.m. deadline in Calgary, while refrigeration shipments can gain as much as six hours on the Drumheller to Winnipeg run over the Calgary to Winnipeg run.

There is daily freight service to Edmonton and Calgary with a maximum delivery time of 24 hours.

Rail Facilities

Due to the mining industry, Drumheller has large storage and switching yards, with switch engines stationed permanently in Drumheller. Little or no problem exists in completing rail connections to factories located on either side of the Red Deer River.

Truck Connections

Drumheller is well served by daily direct trucking services that extend as far as Calgary and Central Saskatchewan, as well as the surrounding villages. After the paving of Highway 56 an additional daily truck service is planned by Dench of Canada Ltd., making a round trip—Calgary, Drumheller, Stettler, Lacombe, Red Deer, Calgary and vice versa with direct connections to Edmonton and points beyond.

Full truck loads can be transported daily to any point in Western Canada on a contract or call basis.

Bus Connections

There are daily bus services between Drumheller, Calgary, Hanna, Stettler, Edmonton, Saskatoon, Saskatchewan, and points between.

Air Services

There is no air service available in Drumheller. The nearest commercial airfield is located in Calgary with direct connections to all points in Canada and the U.S.A. With the development of vertical lift aircraft, and its increasing use, it is conceivable that Drumheller could be served by a V.L.A. feeder line within the next ten years.

Communications

The telephone system in Drumheller is provided by the Alberta Government Telephone on a daily 24 hour basis.

Telegraph services are provided by the C.N. Telegraphs and C.P. Telegraphs. Direct teletype connections are available.

Radio-TV

Drumheller is served by Station CJDV a local enterprise. Calgary radio stations: CFAC, CFCN and CKXL give additional radio and advertising coverage to the area.

TV reception in Drumheller is adequate, with the nearest TV station being CHCT, Calgary.

SECTION B

POSSIBLE INDUSTRIAL DEVELOPMENT OF THE CITY OF DRUMHELLER AND SURROUNDING AREA

INTRODUCTION

In attempting to find suitable industry which could conceivably be located in the Drumheller area careful attention was first given to those products having relatively high consumption in Alberta but not manufactured in the Province, even though the necessary raw materials are available.

A further selection of these products was then made to determine those which could fit into the Drumheller economy.

The industries finally selected are of three basic categories:

1. Industries using natural gas as a raw material.
2. Industries using large amounts of heat or steam.
3. Industries manufacturing low weight/high value articles.

All consumption figures shown in the following pages are based upon estimates supplied by the Alberta Bureau of Statistics unless otherwise stated.

Industries Using Natural Gas

One of the chemical products which could conceivably be manufactured in Alberta is Carbon Black*. Total imports into Canada certainly indicate that an additional Carbon Black plant is feasible.

* Carbon Black is used in a variety of products in addition to its most frequent user, the Rubber Manufacturing Industry (90% of total use) such as paints, coloring agents, polishes, explosives, electrical insulants and preservatives. The main production areas exporting to Canada are the U.S.A. (Louisiana, Texas, Alabama) and Great Britain. Total imports to Canada for the years 1957, 1958 and 1959 are given below:

	Lbs.	$ Value at Factory
** 1957	40,184,591	$2,612,586
1958	31,285,976	$2,184,030
1959	39,364,411	$2,690,894

* Source: Chemical Process Industries, R. N. Shiere Materials Handbook; G. S. Broady Industrial Chemicals,, 2nd Edition; W. L. Frith, D. B. Keyes, R. L. Club Gregory; Uses and Application of Chemicals and Related Materials.

** Source: Trade of Canada, Imports, 1957, 1958, 1959 DBS.

As the minimum sized Carbon Black factory requires 3,000 tons production per year, the above quantities indicate that an additional factory could be supported.

Two tire manufacturing plants are being built and a third is mooted for the Calgary-Medicine Hat area. With the availability of cheap natural gas, a raw material for the manufacture of Carbon Black, a plant of this nature should be considered for the Drumheller area.

Industries Using Large Amounts of Steam

Insufficient attention has been paid to the fact that cheap heat and steam can be produced in the Drumheller area due to the proximity of coal deposits. The following types of industry require relatively cheap heat and steam and could locate in the area:

1. Straw Board and Fibre Board factories.
2. Steam-cured concrete products.
3. Electric Power plants. Such plants could supply the Calgary, Medicine Hat and Edmonton industrial areas and could possibly export power to Saskatchewan.

A recent trend in power plants has shown a return to coal for steam generation. This is particularly in evidence in the Southern U.S.A.

Calgary Power Limited's addition to the Wabamum power plant was also designed for coal use, and indications are that present gas facilities may be converted to coal.

The British Columbia Electric Company has recently invested in a large coal deposit in British Columbia.

It is our opinion that the idea behind this trend is to perhaps convert these plants to atomic steam generation at a later date.

Industries Manufacturing Low Weight/High Value Products

It should be pointed out that industries in this category are diverse and cannot be particularized until the possibility of each has been explored. By their very nature they cannot be attracted to an area on the basis of economic advantage alone. Cultural characteristics and living conditions of the area are often the deciding factors in the location of such an industry. The major example of this type is the electronics industry. Other examples are the watch, fountain pen and instrument manufacturing industries, etcetera.

Some specific industries in this category which could be located in Drumheller are given below:

Toys

Estimates, based on the Canadian per capita consumption of Toys, show the following consumption figures for the Province of Alberta:

1946	1954	1957
$726,400	$1,683,500	$2,528,600

Comparatively few of these Toys were manufactured in Alberta therefore the possibility of such an industry is indicated in the Province.

Drumheller would be an excellent location for such an industry as the peak employment periods of the Toy industry complement the peak employment periods in coal mining, (Toy industry: summer; coal mining: winter) thereby giving a degree of employment stability to the available labour force. This principle was recognized early in Europe and created large Toy industries in Silesia and Bavaria.

Furniture

Estimates, based on the Canadian per capita consumption of Furniture, show the following consumption figures for the Province of Alberta:

	946	1954	1957
Alberta Products	$ 2,000,000	$ 5,262,400	$ 7,904,000
Imports	$ 6,961,500	$11,278,500	$14,669,600
Consumption	$ 8,961,500	$16,540,900	$22,573,600

Import figures indicate that additional manufacturing of furniture in Alberta would be feasible. A well-organized factory specializing in European design (Danish, etcetera) type furniture could compete with present suppliers in British Columbia and Eastern Canada. Drumheller could very well attract such an industry.

Brooms, Mops and Brushes

Estimates, based on the Canadian per capita consumption of Brooms, Mops and Brushes, show the following consumption figures for the Province of Alberta:

1946	1954	1957
$ 874,200	$1,206,100	$1,483,700

Production in Alberta is approximately 10% of total estimated use. An additional small factory manufacturing these articles would appear feasible. Production of Mops, Brooms and Brushes could be undertaken on a factory basis; as a home craft industry with a central sales organization; or as a combination of both.

Miscellaneous Sporting Goods

The import of miscellaneous sporting goods to Alberta shows the following dollar figures:

1946	1954	1957
$498,000	$1,198,700	$1,570,000

Although a great number of articles is grouped under this heading, a small industry manufacturing Toboggans, Skis and Ice Hockey Sticks could be supported. Such an industry could be operated on the same basis as toy manufacturing because the peak employment periods again complement the peak employment periods of the coal-mining industry.

In addition to the above mentioned, an industry manufacturing costume jewellry and novelties from fossils found in the Drumheller area may well be profitable in view of the increase in lapidarists in the U.S. and Canada.

Furthermore the City would be well advised to seek an assembly plant of foreign manufactured radio, photographic or electronic components. The establishment of such industries is presently being greatly assisted in the U.S.A. through "Intransit Privileges". These prerequisites are necessary for competitive success and should be negotiated with the respective railroads.

NOTE—GENERAL

The following guide is given to assist those charged with the responsibility of locating industrial plants in Drumheller.

Attention should be given to the relationship of "transfer costs" of raw materials and finished products. Listed below are the three types of raw material:

1. Pure materials which are included in the manufactured article without loss of weight.

2. Weight-losing materials, only a part of whose weight is represented in the weight of the finished article.

3. Ubiquities or materials found virtually everywhere.

Simply then, if freight rates are uniform, it follows:

1. Where a single pure material is used, location can be at the source of the material, at the market, or at any point in between.
2. If a weight-losing material is used, it is cheaper to carry on the manufacture at the source than to transport it to market as the finished product is lighter in weight.
3. If a ubiquity is used, location should be at the market since the material is universally available.

Industry then, will tend to locate at that point where it will have the lowest combined transportation cost.

Drumheller generally, fits into the category of an intermediate location, i.e. between raw material sources and markets where combined freight costs are usually higher, due to two terminal costs and a line haul cost, than as a location at the material source or at the market. This disadvantage may be partially overcome by the extension of intransit privileges by the railways. This is simply the application of a through-rate from origin to final destination with only nominal charges for interruption of the movement at the intermediate location.

SECTION C

TOURISM

TOURIST POTENTIAL

The "Badlands" surrounding Drumheller are known the world over for their spectacular content of prehistoric fossils. It is one of the largest known deposits of the remains of Dinosaurs and other prehistoric animals.

The scenery is picturesque and unusual. The peculiar clay formations tend to give an eerie prehistoric appearance to the Badlands. The area is an ideal holiday resort for the growing number of "rock hounds" in Canada and the U.S.A. The occurrence of fossils is so frequent that even the beginner can be assured of making finds of petrified wood, seeds, acorns, etc. With the exception of the Badlands no other tourist attractions are available in the area. Accommodation facilities are lacking and campsites are non-existent. With proper planning and organization the Drumheller Badlands could be a successful tourist attraction.

Development of Drumheller as a Tourist area would require the following:

1. Erection of a museum of sufficient size to accommodate some restored prehistoric skeletons.
2. Construction of campsites to enable the tourist to remain in the area for several days.
3. Upgrading of the present hotel facilities.
4. Guided Tours through the Badlands.
5. A park area patterned on St. George Island Zoological Gardens in Calgary, Alberta.
6. Extensive advertising campaign.

TABLE IA

Available for Employment, Quarterly Periods 1959,
By Job Classification

MALE

	March	June	Sept.	Dec.
Accountants	2			1
Managerial and Official	10	2	1	2
Bookkeepers	4	1	1	2
Office Clerks	12	9	5	8
Sales Clerks	8	5	5	10
Cooks, Chefs	2	2	1	3
Dishwashers	1	1		1
Bartenders	7	2	2	4
Watchmen	23	3	3	4
Janitors	11	3	9	10
Farm Hands	14	6	2	8
Bakery Workers	1		1	2
Structural Steel Workers	2			1
Welders	1	1		2
Blacksmiths	3	5	1	1
Welders' Helpers	1			1
Electricians	1	1		1
Miners	232	118	12	20
Petroleum Workers	30	21	5	3
Construction Machinery Operators	16		1	19
Bricklayers	3			1
Carpenters	19	3		12
Painters	5		1	4

(Continued page 28)

TABLE 1A

	March	June	Sept.	Dec.
Plasterers	1			
Plumbers & Steam Fitters	5	1	1	1
Carpenters', Plumbers', Painters', Plasterers' Helpers	5	1		3
Deliverymen	1			
Truck and Cat Operators	87	12	5	52
Teamsters-Drivers	39	32	3	24
Linemen	2	1		2
Butchers	2			2
Service Station Attendants	9	1	3	2
Stationary Engineers	5	4	1	2
Cranemen, Shovelmen	28	9		2
Oilwell Drillers	19	3	2	9
Atuo Mechanics	8	1		4
Assemblers, Rodmen, etc.		25		
Building & Construction Foremen	11	3	1	5
Apprentices	4	1		6
Sawmill Workers	2	2		2
Metal Workers	3	3	2	4
Mine Labourers	46	30		
Construction Labourers	152	48	11	89
Machinists		2		
Stationary Engineers			1	
Construction Machinery Operators			1	
Printers—Apprentices			1	1
Machinists			3	2
Roughnecks, Farm Machinery Assemblers, Rodmen, etcetera	33		4	6
Mine Labourers			7	12
Laundry Workers				1
Railroad Mechanics	7			3
Glaziers				1
Warehousemen	20			2
Electrical Helpers	3			
Garbage Collectors	1			
Mine Trimmers, Oilers		7		
Boilermakers			1	
Travelling Salesmen				2
Sawmill Workers	2			2
Plumbers				1

Source: National Employment Service.

TABLE IB

Available for Employment, Quarterly Periods 1959, By Job Classification

FEMALE

	March	June	Sept.	Dec.
Bookkeepers	11	9	3	5
Office	13	13	9	8
Secretaries, Stenographers, Typists	6	10	5	2
Sales Clerks	22	13	18	23
Cooks, Chefs	11	2	1	11
Waitresses	6		6	12
Dishwashers	8	7	4	
Domestics	12	4	3	8
Janitors	1	1		
Bakery Workers	1	1		
Seamstresses	1		1	1
Electrical Assemblers	1			
Managerial and Office		1	2	2
Farm Housekeepers		1	1	
Laundry Workers		2	2	3

Source: National Employment Service.

March June Sept. Dec.

TABLE II

Persons Available for Employment in Drumheller

(Not Classified)

	1950		1951		1952		1953		1954	
	M	F	M	F	M	F	M	F	M	F
January	220	33	264	35	158	39	247	35	297	27
February	256	43	276	35	160	34	420	41	397	30
March	365	42	297	33	194	40	715	38	632	36
April	285	41	197	33	149	37	631	30	522	53
May	285	40	146	22	158	46	519	30	386	36
June	292	38	122	26	147	42	247	44	265	45
July	228	33	83	29	142	31	159	48	152	40
August	194	29	70	28	115	21	87	29	146	42
September	144	25	48	24	86	31	71	28	88	33
October	176	25	67	31	81	32	96	29	84	41
November	189	33	97	39	92	20	116	24	114	36
December	206	28	120	31	161	26	195	23	261	44

	M	F	M	F	M	F	M	F	M	F
	1955		1956		1957		1958		1959	
January	380	74	306	72	282	60				
February	528	72	342	73	430	63				
March	710	76	574	73	596	59				
April	613	54	452	52	446	37				
May	417	50	229	46	301	38				
June	293	32	178	35	209	37				
July	256	37	142	28	167	33				
August	119	33	118	33	148	37				
September	96	43	60	42	91	50				
October	83	62	60	44	132	51				
November	152	60	126	48	234	64				
December	240	48	217	51	440	81				

Source: National Employment Service.

TABLE III

WAGE RATES

SELECTED OCCUPATIONS
DRUMHELLER AREA

(January, 1960)

Occupation	Sex	Wage Rate	Period
Managerial	M	$160.00—$335.00	Month
Bookkeepers	M	200.00— 300.00	"
Bookkeepers	F	128.00— 180.00	"
Office Clerks	M	180.00— 220.00	"
Office Clerks	F	128.00— 180.00	"
Sales Clerks	M	35.00— 50.00	Week
Sales Clerks	F	23.00— 40.00	"
Cooks, Chefs	M	50.00— 65.00	"
Cooks, Chefs	F	32.00— 40.00	"
Waiters	M	Union Rate	"
Waitresses	F	22.00— 30.00	"
Bartenders	M	Union Rate	"
Dishwashers	M	30.00	"
Dishwashers	F	20.00— 25.00	"
Janitors	M	100.00— 200.00	Month
Janitors	F	50.00— 100.00	"
Domestics	F	50.00— 70.00	"
Farmhands	M	100.00— 200.00	"
Bakery Workers	M	50.00	Week
Bakery Workers	F	23.00— 30.00	"
Blacksmith, Mine	M	14.92	Shift
Construction Machine Operator	M	1.60— 1.90	Hour
Bricklayers	M	2.00	"
Carpenters	M	1.75— 2.00	"
Painters	M	2.00	"
Plasterers	M	2.00	"
Plumbers and Steamfitters	M	2.00	"
Delivery Men	M	50.00	Week
Truck Drivers	M	1.25— 1.40	Hour
Cat Operators	M	1.60— 1.80	"
Truck Drivers (Teamsters)	M	Union Rate	"
Linemen	M	1.65	"
Butchers	M	2.00— 3.00	Hour
Service Station Attendants	M	30.00— 50.00	Week
Stationary Engineer	M	1.65— 1.95	Hour
Cranemen, Shovelmen	M	1.60— 1.90	"
Oilwell Drillers	M	2.65— 2.70	"
Auto Mechanics	M	70.00— 90.00	Week
Mine Labourers	M	12.88— 14.97	Shift
Construction Labourers	M	1.20— 1.56	Hour
Mine Trimmers	M	14.88	Shift

Source: National Employment Service.

TABLE IV

CHEMICAL & GEOLOGICAL LABORATORIES LTD.

Edmonton, Alberta

GAS ANALYSIS REPORT

FIELD .... Drumheller, Alberta.

WELL NO.: Stockton-Socony
CPR #3

OPERATOR .... Great Northern Gas Utilities Ltd.

SAND .... Basal Quartz

LOCATION: 11-27-28-20 W4th
DEPTHS: 4325'- 4350'

LAB. NO.: 5992

ANALYZED BY .... Chemical & Geological Labs Ltd.

DATE RECEIVED: July 5/54
REPORTED July 8/54

REMARKS .... Sample taken June 30th, 1954.
Critical test flow. 50 p.s.i.g.
on own container

PODBIELNIAK
Low Temperature Fractionation

	% by Volume	G.P.M. in U.S. Gals.	G.P.M. in Imp. Gals.
Oxygen	0.00		
Nitrogen	1.89		
Carbon Dioxide	0.88		
Hydrogen Sulfide	0.00		
Methane	81.49		
Ethane	6.65		
Propane	4.10	1.125	0.918
Isobutane	0.85	0.277	0.226
N-butane	1.19	0.374	0.306
Isopentane	0.63	0.230	0.188
N-pentane	0.63	0.228	0.186
Diisopropyl	—	—	—
Hexane	1.04	0.427	0.348
Heptanes and Higher	0.65	0.315	0.259
TOTAL	100.00	2.976	2.431
Gross B.tu by Pod		1250	1233
Specific Gravity by Pod		0.742	0.742
Specific Gravity by Weight		0.746	0.746
	G. P. M.		
Actual Pentanes +		1.200	0.981
Calculated at 12 lbs.		1.257	1.028
Calculated at 15 lbs.		1.338	1.094
Calculated at 22 lbs.		1.576	1.288
Calculated at 26 lbs.		1.754	1.434
Vapor pressure (calculated) of actual pentanes +		9.64	9.64

Remarks and Conclusions .... Reported at 60°F and 14.7 p.s.i.a. with G.P.M. in U.S. Gallons.

Reported at 60°F and 14.4 p.s.i.a. with G.P.M. in Imperial Gallons

Considerable amount of condensate in container.

TABLE V

CHEMICAL & GEOLOGICAL LABORATORIES LTD.

Edmonton, Alberta

GAS ANALYSIS REPORT

FIELD ....South Drumheller, Alberta
OPERATOR ....Great Northern Gas Utilities Ltd.
WELL NO.: Stocton Socony CPR #1
LOCATION: 10-22-28-29 W4th
ANALYZED BY ....Chemical & Geological Labs. Ltd.
DATE: Received July 23/54
Reported July 24/54
REMARKKS ....150 p.s.i.g. on container 93 at Laboratory.

	% by Volume	G.P.M. in U.S. Gals.	Imp. Gals.
Oxygen	0.00		
Nitrogen	4.30		
Carbon dioxide	0.00		
Hydrogen Sulfide	0.00		
Methane	85.73		
Ethane	6.02		
Propane	2.85	0.782	0.638
Isobutane	0.49	0.160	0.130
B-butane	0.49	0.154	0.126
Isopentane	0.04	0.015	0.012
N-pentane	0.04	0.014	0.012
Hexanes +	0.04	0.018	0.015
N-Hexane	—	—	—
Heptane and Higher	—	—	—
TOTAL	100.00	1.143	0.993
Gross B.tu by Pod		1083	1060
Specific Gravity by Pod		0.645	0.645
Specific Gravity by weight		0.647	0.647
	G. P. M.		
Actual pentanes		0.047	0.039
Calculated at 12 lbs.		—	—
Calculated at 15 lbs.		0.049	0.041
Calculated at 22 lbs.		0.057	0.048
Calculated at 26 lbs.		0.063	0.053
Vapor pressure (calculated) of actual pentanes		12.60	12.52
Remarks and Conclusions	Reported @ 60°F with 14.7 p.s.i.a. with G.P.M. in U.S. Gallons Reported at 60°F with 14.4 p.s.ia. with G.P.M. in Imperial Gallons		

TABLE VI

CHEMICAL ANALYSIS OF ALBERTA BENTONITES*

Sample No.	No. 2 (Rosedale)	No. 5 (Beynon)	No. 6 Dorothy
SiO_2	57.18	63.61	63.74
Al_2O_3	20.25	17.37	13.89
TiO_2	0.11	0.24	0.33
Fe_2O_3	2.08	3.18	3.32
FeO	0.51	0.60	0.09
MuO	0.00	0.01	0.01
MgO	2.72	1.86	1.75
CuO	1.09	1.19	1.10
Na_2O	2.21	2.18	2.40
K_2O	0.30	0.63	0.69
H_2O—	8.44	4.16	6.00
HO+	4.79	3.99	3.89
Loss on Ignition	0.67	1.11	0.93
	100.35	100.13	100.14

NOTE: Sample No. 5 (Beynon) and No. 6 (Dorothy) were taken in the general Drumheller area but not in the prime area of influence.

*Source: Bentonite in Alberta by P. J. S. Byrne, Research Council of Alberta, Report No. 71

TABLE VII

AGRICULTURE DRUMHELLER AREA 1956*

Municipal District	Total Acreage	Wheat Acreage	Oats Acreage	Barley Acreage
40	1,111,534	260,638	47,069	82,538
42 ID	28,522	3,855	851	789
47	609,752	150,965	21,019	28,674
48	810,102	196,579	46,179	79,213

	Rye Acreage	Flax Seed Acreage	Mixed Grain Acreage	Hay Acreage
40	2,037	25,945	1,538	20,657
42 ID	—	510	22	551
47	2,307	2,664	836	10,974
48	1,185	4,508	1,517	17,104

	Fodder Acreage	Potato Acreage	Acreage	Acreage
40	2,525	164		
42 ID	205	21		
47	2,464	142		
48	7,092	123		

NUMBER OF ANIMALS DRUMHELLER AREA 1956*

Municipal District	Horses	Cows	Sheep	Pigs	Chickens
40	1,889	3,988	8,194	27,593	45,889
42 ID	42	101	—	688	970
47	1,124	1,201	878	5,621	23,357
48	1,427	4,438	1,525	22,446	77,540

* Source: Agriculture, Alberta, 1956 DBS

TABLE VIII

CANADIAN UTILITIES LIMITED — DRUMHELLER

POWER RATE SCHEDULE

Drumheller Residential Rate:	First 25 KWH used per month @	.05 per KWH
	Next 100 KWH used per month @	.02½ per KWH
	Excess KWH used per month @	.01½ per KWH
	Demand Charge	.50 per month
	Minimum Charge	$1.25 per month
Drumheller Commercial Rate:	First 50 KWH used per month @	.05 per KWH
	Next 100 KWH used per month @	.04 per KWH
	Excess KWH used per month @	.03 per KWH
	Demand Charge	.50 per month for each 1,000 watts of connected load
	Minimum Charge	Demand Charge but not less than $1.25 per month
Drumheller Power Rate:	First 25 KWH used per month per HP connected load @	.05 per KWH
	Next 50 KWH used per month per HP connected load @	.03 per KWH
	Excess KWH used per month per HP connected load @	.02 per KWH
	Demand Charge	Nil
	Minimum Charge	$1.00 per HP connected load but not less than $2.00 per month

* Source: Agriculture, Alberta, 1956 DBS

TABLE IX

PLAINS WESTERN GAS AND ELECTRIC CO. LTD.—DRUMHELLER

GAS RATE SCHEDULE

First	3,000 cu. ft. per month	$2.50
Next	40,000 cu. ft. per month	46c per M cu. ft.
Next	77,000 cu. ft. per month	42c per M cu. ft.
Balance	cu. ft. per month	38c per M cu. ft.
Minimum monthly bill		$2.50

TABLE X

WATER RATES — CITY OF DRUMHELLER

Minimum monthly rate $2.50

First	5,000 cu. ft. per month @	75c per M cu. ft.
Next	5,000 cu. ft. per month @	69c per M cu. ft.
Next	10,000 cu. ft. per month @	63c per M cu. ft.
Next	30,000 cu. ft. per month @	56c per M cu. ft.
Next	100,000 cu. ft. per month @	44c per M cu. ft.
All over	200,000 cu. ft. per month @	38c per M cu. ft.

WATER ANALYSIS — CITY-OWNED WELLS

Water Analysis	Parts per Million
Calcium (Ca)	77.5
Magnesium (Mg)	21.6
Sodium (Na) by calculation	31.4
Bicarbonate as Carbonate (Co)	153.6
Carbonate (CO_3)	trace
Sulphate (SO_4)	75.2
Chloride (Cl)	4.5
Nitrate (NO_3)	14.65
Silica (SiO_2)	0.5
Alumina and Iron Oxide (Al_2O_3)	0.5
Organic matter or loss on ignition	6.0
Total dissolved solids (by calculation)	390.8
Total dissolved solids (by determination)	384.0
Hardness	287.3
Iron (Fe)	0.2
Manganese (Mn)	0.84
Ammonia Nitrogen	0.026
Albuminoid Ammonia Nitrogen	0.02
Nitrite Nitrogen	0.004
Nitrate Nitrogen	3.33
Colour (Hazen)	some coagulated
Sediment	slight
Alkalinity to Phenolphalein Ph	7.45

TABLE XI

ANALYSIS OF RED DEER RIVER WATER

Ph	8.3		
Color	7.0		
Turbidity	67.		
$CaCo_3MeO$	4.0		
CaO_3MeO	16.3		
Suspended Matter			
Dried 105C°		81.6	
Ignited 550C°		73.3	
Residue from evaporation			
Dried at 105C°		210.	
Ignition Loss		32.	
Conductivance at 25C°		331.	
Hardness $CaCo_3$ Total			174.8
Carbonate		163.0	
Non-Carbonate		11.8	
Calcium	47.0		
Magnesium	14.0		
Iron total	15.12		
Iron Dissolved	.035		
Sodium	6.5		
Potassium	1.1		
CO_3	4.8		
HCO	189.1		
SO_4	21.7		
Chlorine	1.0		
Fluorine	0.2		
NO_3	0.5		
SiO_3 Colloidal	6.1		

Please note all figures are in parts per million.

CERTIFICATION

THIS IS TO CERTIFY THAT this Economic Development Analysis of City of Drumheller and Area, Province of Alberta, was conducted under conditions representing the highest standard of professional ethics; that no member of our staff was biased either in favour of or against the issues mentioned herein; and that the results presented herein are in accordance with fact to the best of my knowledge and belief.

ATTESTED to this twenty-ninth day of March, 1960, at Vancouver, B.C.

JOSEPH B. WARD AND ASSOCIATES LIMITED
Consulting Economists and Engineers

A. L. GRAY,
President.